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Appendix
Analysis in Support of Comments of the California Air Resources Board on Corporate Average Fuel Economy Standards for Model Years 2024-2026 Passenger Cars and Light Trucks, Docket ID No. NHTSA-2021-0053

October 26, 2021

Table of Contents

I. Introduction 2

II. The Proposal Meets the Statutory Direction to Conserve Energy and Establish Maximum Feasible Standards, and the Technology Currently Exists to Meet More Stringent Standards. 3

III. The Benefits of the Proposed Standards Outweigh the Costs and Are Greater Than NHTSA Estimated. 9

  A. Stringent Standards Increase Domestic Energy Security. 9

  B. NHTSA's Rebound Effect and Sales Elasticity Are Too High........ 11

  C. NHTSA's VMT Projections Are Not Matching Actual VMT. 12

  D. NHTSA's Congestion Costs Still Contain Errors. 13

IV. The Proposal Provides Beneficial Emission Reductions to Mitigate a Changing Climate and Protect Public Health—Especially Those Most Exposed to Pollution. 14

  A. The Proposed Standards Will Provide Critically Needed Greenhouse Gas Reductions. 14

  B. The Proposed Standards Will Reduce Harmful Particulate Pollution and Better Protect Public Health Through 2050. 15

  C. Stringent Standards Will Reduce Disparate Pollution Impacts. 16

    1. NHTSA Has Environmental Justice Obligations and Should Factor Those in Accordingly. 17

    2. The Los Angeles Area Illustrates the Importance of Stringent Standards. 18

V. Conclusion 24

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I. Introduction

The California Air Resources Board (CARB) welcomes the proposal by the National Highway Traffic Safety Administration (NHTSA) to revise its 2024-2026 model year light-duty vehicle fuel economy standards.[1] The previous standards, promulgated in 2020, were ill-supported and not reflective of the best available evidence and the current state of technology. As NHTSA acknowledges, the technology currently exists to meet both NHTSA's preferred Alternative 2 and the more stringent Alternative 3, and CARB supports the most stringent standards feasible. CARB offers the following comments in further support of the proposal.[2]

Both Alternatives 2 and 3 correct serious errors in its 2020 rule, the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (Final SAFE Rule),[3] which improperly set standards far below levels that have clearly been feasible for many years. The extensive record supporting the previous National Program standards, the draft Technical Assessment Report in 2016 and analyses by the U.S. Environmental Protection Agency (EPA) of its harmonized vehicle greenhouse gas emission standards in its Midterm Evaluation, and the increasing pace and declining cost of applicable vehicle technologies have all supported the National Program standards—including the "augural" standards NHTSA is now proposing to work back toward—and shown those standards are technologically feasible and significantly net beneficial.

As CARB and many others explained in multiple comments on the SAFE proposal[4] and subsequent briefing in the litigation challenging the Final SAFE Rule,[5] NHTSA's decisions, actions, and supporting analyses were deficient and fundamentally wrong in many respects. The Final SAFE Rule also failed to meet NHTSA's fundamental obligation under the Energy Policy and Conservation Act (EPCA) to conserve energy, as it allowed greater consumption of oil despite the availability of feasible, cost-effective technologies to improve vehicle fuel economy. NHTSA properly recognizes this here and has weighed the factors relevant to setting fuel economy standards in a manner consistent with congressional direction.

The targeted fuel economy levels under the National Program have been and continue to be appropriate and feasible; indeed, CARB agrees that manufacturers have developed the technology to meet Alternative 3. CARB notes that the feasibility of standards more stringent than NHTSA's preferred alternative becomes even more apparent when NHTSA adjusts parts of its analyses to rely on the best available evidence. In particular, NHTSA's choice of a 15 percent rebound effect—though improved from the Final SAFE Rule—is still too high and not well supported in the literature. Similarly, NHTSA's selection of a -1 price elasticity is much too high, and NHTSA still excludes certain technologies that were demonstrably available back in 2018. Adjustments to these pieces, as well as others, described in more detail below, would further demonstrate the benefits of more stringent standards.

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[1] 86 Fed. Reg. 49,602 (Sept. 3, 2021), Docket No. NHTSA-2021-0053.

[2] To be clear, a lack of comment on a piece of NHTSA's proposal does not indicate CARB necessarily agrees with NHTSA's analysis therein.

[3] 85 Fed. Reg. 24,174 (April 30, 2020).

[4] 83 Fed. Reg. 42,986 (Aug. 24, 2018).

[5] *See, e.g., Competitive Enterprise Institute v. National Highway Traffic Safety Administration,* Proof Brief of State and Local Gov't Petitioners (Docket No. 1880213) (D.C. Cir., Case No. 20-1145, consolidated with case nos. 20-1167, -1168, -1169, -1173, -1174, -1176, -1177).

CARB also echoes the comments in the accompanying submittal by the California Attorney General on behalf of California, many other states and commonwealths, and several cities.[6] For these and the following reasons, NHTSA should adopt standards more stringent than the existing requirements, and the most stringent standards it determines are the maximum feasible under EPCA.

II. The Proposal Meets the Statutory Direction to Conserve Energy and Establish Maximum Feasible Standards, and the Technology Currently Exists to Meet More Stringent Standards.

CARB supports NHTSA's return to prioritizing energy conservation in balancing its statutory factors and setting the maximum feasible standards.[7] As the proposal discusses, Congress directed NHTSA to adopt the maximum feasible motor vehicle fuel economy standards in order to conserve energy and improve vehicle fuel efficiency. The current standards do not fulfill this core mandate—in fact, they do the opposite by allowing increased fuel consumption.

More stringent standards, like those of Alternatives 2 and 3, satisfy NHTSA's statutory directive. And not only do those Alternatives conserve energy, but they also reduce air pollution. CARB supports and agrees with the comments of the California Attorney General and multi-state coalition that this range of proposed standards advances the objectives of EPCA while providing important societal benefits and offers the following additional comments regarding available technologies.

Manufacturers have developed the requisite technology, have time to deploy it, and can do so at reasonable cost within the time provided to meet the more stringent alternatives. Indeed, NHTSA now "is certain that sufficient technology exists to meet the [proposed] standards—even for the most stringent regulatory alternative."[8] In response to comments on the SAFE Rules and actions, including from CARB,[9] NHTSA has partially revised its prior analysis of technologies for meeting fuel economy standards. For example, NHTSA appears to have included application of the Miller cycle, whereas in the SAFE proposal NHTSA had inexplicably excluded it.[10] NHTSA also now includes some high-compression ratio (HCR) engines, whereas previously NHTSA had largely excluded these from consideration despite them being demonstrated in the market.

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[6] Detailed Comments of States and Cities Supporting NHTSA's Proposal to Strengthen Its Corporate Average Fuel Economy Standards for New Light-duty Vehicles, October 26, 2021 (hereinafter "Multistate Comments").

[7] *E.g.*, 86 Fed. Reg. at 49,788 (citing *Center for Biological Diversity v. NHTSA*, 538 F.3d 1172, 1197 (9th Cir. 2008)).

[8] 86 Fed. Reg. at 49,792.

[9] Analysis in Support of Comments of the California Air Resources Board on the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, at 107 (Oct. 26, 2018), Docket No. NHTSA-2018-0067-11873, (hereinafter "CARB 2018 Detailed Comments").

Nevertheless, NHTSA appears to have some holdovers from the SAFE analysis. For instance, NHTSA appears to have continued limiting application of cooled exhaust gas recirculation to turbocharged and basic engines, despite CARB previously commenting that it has also been incorporated into vehicles with increased and high compression ratios.[11] And while NHTSA has included some application of HCR0 and HCR1 engines and added an HCR1D engine to the analysis, which CARB supports, NHTSA has inappropriately constrained these technologies' application, still unjustifiably excluded HCR2, and made errors in its modeling to exclude application of HCR1D in its central analysis and both HCR1D and HCR2 in its "no HCR skip" sensitivity analysis. CARB commented extensively on the exclusion of HCR2 in the SAFE proposal[12]; CARB incorporates those comments here and offers some further comments.

For the central analysis, NHTSA intended HCR0, HCR1, and HCR1D to be available for adoption, but not HCR2.[13] HCR technology also seems restricted to engines already on the HCR technology path or not yet on any technology path.[14] NHTSA further barred HCR technologies from all pickups and vehicles that share an engine with a pickup, vehicles with 405 or more horsepower, and certain performance-oriented manufacturers.[15] In practice, however, these restrictions prevent the model from adding HCR technologies to the vast majority of engines with 6 or more cylinders.[16]

The compliance model's limitations on HCR technology availability are unwarranted. HCR technology should be available for use on engines used in pickups and other high-load vehicles. In the SAFE Rule, NHTSA did not allow HCR technology on all pickups and engines with 6 or more cylinders, arguing that these engines operated at higher loads that did not allow for much benefit from Atkinson-cycle operation.[17] The restriction on HCR technology in 6 or more cylinder engines quickly proved incorrect, as several vehicles with 6 or more cylinders incorporated Atkinson engines, even prior to finalization of the SAFE Rule. NHTSA now acknowledges that fact.[18] Nonetheless, NHTSA continues to assert that HCR technology is inappropriate for pickups based on the same flawed reasoning it used to block HCR technology in the Final SAFE Rule from engines with 6 or more cylinders.[19] While a pickup engine with variable valve timing is unlikely to operate in Atkinson cycle when towing or hauling heavy cargo, these applications represent only a portion of a pickup's uses. Indeed, the purpose of variable valve timing is to allow an engine to operate efficiently in Atkinson cycle when possible, but to allow Otto-cycle operation when greater power density is required. Consequently, several engines in pickup trucks currently incorporate HCR technology, taking advantage of Atkinson-cycle operation to improve fuel economy. For example, the Toyota Tacoma features a V6 Atkinson cycle engine, and the Dodge Ram Pentastar V6 engine includes variable valve lift and cam phasers that allow Atkinson-cycle operation. As HCR technology was not allowed on pickups in the proposal's modeling, NHTSA is unable to accurately represent these vehicles. The initial adoption of HCR technology onto certain pickups also indicates that more widespread adoption and further advances are possible. Moreover, automakers have made significant progress lightweighting pickups, such as the all-aluminum Ford F-150. These load reduction improvements would enable broader Atkinson-cycle operation, suggesting that HCR technology is a reasonable compliance option even in pickups and other traditionally high-load applications.

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[10] *Compare* NHTSA, Technical Support Document: Proposed Rulemaking for Model Years 2024-2026 Light-Duty Vehicle Corporate Average Fuel Economy Standards, at 189 (Aug. 2021) (hereinafter "TSD"), *with* CARB 2018 Detailed Comments at 107.

[11] TSD at 188; CARB 2018 Detailed Comments at 103-107.

[12] CARB 2018 Detailed Comments at 100-103; *see also* Rogers, G., Roush Industries, *Technical Review of: The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, Final Report* (Oct. 25, 2018). EPA also notes and includes many examples of expanded HCR engines in the fleet since 2016 in its analysis for its proposed light-duty greenhouse gas standards. EPA, Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis at 2-11 to 2-13 (Aug. 2021) (hereinafter "EPA DRIA").

[13] TSD at 171.

[14] *See* TSD at 187 Fig. 3-4 (noting how engines progress along discrete advanced engine paths).

[15] TSD at 188.

[16] Model File Central Analysis/input/market_data_000000.xlsx.

NHTSA's modeling should also allow expanded application of HCR technology generally and application of HCR2 specifically. Limiting HCR application to those already on that technology path (or not yet on any technology path) is overly restrictive and not fully capturing the current market. Manufacturers are capable of and have deployed different engine technologies across their products without necessarily adhering to that premised limitation. Even with the addition of HCR1D, the HCR technologies intended to be allowed in the modeling cannot capture technologies and efficiency improvements in marketed vehicles. For instance, while NHTSA seems to have intended HCR1D to represent the Mazda SkyActiv-G engine found in the Mazda CX-5 and Mazda6 beginning in model year 2018, other manufacturers have improved on HCR1 in other ways, such as the 2018 Camry and

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[17] *See, e.g.*, 85 Fed. Reg. at 24,408.

[18] TSD at 188 n. 200. Note that many more vehicles with V6 engines use HCR technology than NHTSA names. Examples include Lexus vehicles with the 2GR-FKS engine and pickups discussed below. Chrysler's Pacifica Hybrid also uses a V6 Atkinson-cycle engine with a plug-in hybrid system, and it is reasonable to expect FCA to spread that engine across its lineup in future years.

[19] TSD at 188 ("We also exclude pickup trucks and vehicles that share engines with pickup trucks from receiving HCR engines; the duty cycle for these heavy vehicles, particularly when hauling cargo or towing, are likely unable to take full advantage of Atkinson cycle use, and would ultimately spend the majority of operation as an Otto cycle engine, negating the benefits of HCR technology.").

Corolla's incorporation of cooled exhaust gas recirculation into an HCR engine. The available HCR packages do not represent these innovations.

Moreover, EPA benchmarking research has demonstrated that the 2018 Camry's A25A-FKS engine's addition of cooled exhaust gas recirculation achieves efficiency similar to the modeled effectiveness of that technology in EPA's HCR2 package—in fact, the modeled effectiveness was "perhaps conservative."[20] NHTSA should either use HCR2 as a proxy for HCR engines with similar efficiency (like the A25A-FKS engine), or it should define a technology option representing similar levels of efficiency. As testing of the A25A-FKS engine suggested that EPA's modeled HCR2 effectiveness estimates were conservative, further efficiency improvements beyond HCR2's projected efficiency are likely possible in the near term. Therefore, at minimum, the modeling should allow adoption of HCR2 to reflect expected efficiency gains in the rulemaking timeframe. Nearly all of the vehicles with first- and second-generation HCR technology are scheduled to be redesigned by MY 2026. One would expect that automakers will continue to innovate, such that, by MY 2026, HCR engines would surpass HCR2's modeled efficiency. Therefore, allowing adoption of HCR2 in the compliance modeling is a more accurate (and perhaps conservative) representation of the current and expected technological landscape for this rulemaking. And CARB notes that EPA does include HCR2 in its analysis for compliance with its proposed greenhouse gas emission standards for light-duty vehicles.[21]

NHTSA's stated reasons for disallowing HCR2 in the modeling are unpersuasive. First, NHTSA asserts that it believes HCR0, HCR1, and HCR1D "reasonably represent[] the application of Atkinson cycle engine technologies within the current light-duty fleet and the anticipated applications of Atkinson Cycle technology in the MY 2024-2026 timeframe."[22] It does not explain its reasoning, however. As discussed above, engines with technology efficiencies equivalent to HCR2-level technologies have been available in the market since model year 2018, and further improvements are likely by model year 2026. For the reasons explained above, including HCR2 in the modeling would be a conservative option to reflect this reality. Second, NHTSA argues that adoption of HCR2 would require an engine redesign, and so would not be likely before model year 2026.[23] But the modeling accounts for engine redesign cycles, so it would only add HCR2 when an engine is scheduled to be redesigned.[24] A substantial portion of the light-duty fleet is projected to be redesigned in the next four years, so the modeling should allow manufacturers to apply HCR2 as a compliance option.[25] Finally, NHTSA contends that it is reasonable to not include any updated considerations to the HCR packages in this rulemaking because manufacturers are anticipating greater returns on electrification compared to conventional engine technology improvements.[26] While manufacturers are increasingly committing to electrified powertrains, many manufacturers will continue to use conventional engine technologies to meet the CAFE standards.[27] The modeling should reflect all options for improving efficiency that manufacturers have at their disposal, including HCR2.

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[20] Kargul, J., Stuhldreher, M., Barba, D., Schenk, C. et al., "Benchmarking a 2018 Toyota Camry 2.5-Liter Atkinson Cycle Engine with Cooled-EGR," SAE Int. J. Adv. & Curr. Prac. in Mobility 1(2):601-638, 2019, https://doi.org/10.4271/2019-01-0249, *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7425626/pdf/nihms-1606144.pdf*. In this context, "efficiency" refers to thermal efficiency.

[21] *See, e.g.*, EPA DRIA at 4-4 ("The decision to allow for more broad application of HCR1 and HCR2 technologies as a compliance choice within the model was considered by EPA to be of significant importance to update relative to the SAFE FRM. We made that choice because it is a very cost-effective ICE technology that is currently in use and already in broad application with no consumer choice concerns such as those that might be argued for BEV technology."). Though EPA and NHTSA are regulating different things (vehicle emissions vs. vehicle fuel efficiency), HCR engines are a technology that automakers can use to comply with both agencies' standards. It is puzzling that NHTSA, without much explanation, excludes HCR2 when EPA finds that HCR2 is cost-effective and available for inclusion; should NHTSA still exclude HCR2 and even broader application of HCR1 and HCR1D in the final rule, NHTSA should explain why it is reaching a different conclusion from its sister-agency.

[22] TSD at 200.

Others have previously argued that including HCR2 technology in the modeling would be speculative because the exact combination of technologies in the simulated HCR2 package have not yet appeared in a marketed vehicle. But in the context of modeling compliance paths, minor differences between the exact HCR technology packages modeled and the HCR technology packages in marketed vehicles are irrelevant. As noted above, EPA benchmarking has shown that real HCR engines have achieved levels of efficiency consistent with modeled HCR2 levels. Moreover, the specific differences are themselves inconsequential. For example, while the HCR2 technology package was simulated with high-octane fuel, HCR1 was also simulated with high-octane fuel and is used as a reasonable proxy for the efficiency levels real HCR1-level engines achieve.[28] Additionally, although the HCR2 package currently includes both cooled exhaust gas recirculation and cylinder deactivation and marketed vehicles to date have only incorporated one or the other, there is no technological constraint that prevents manufacturers from using both in the future. Indeed, given that the 2018 Camry's addition of exhaust cooled gas recirculation may suggest HCR2's modeled effectiveness is "perhaps conservative," manufacturers' inclusion of both cooled exhaust gas recirculation and cylinder deactivation may even surpass HCR2's simulated efficiency. As these technologies exist and are available for inclusion in a redesigned engine, NHTSA's modeling would likely be conservative even if HCR2 were included. Accordingly, NHTSA should include HCR2 in its compliance modeling for the final rule and continue its work to develop improved engine maps for HCR technology to ensure they reflect the latest technological advances.

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[23] TSD at 200.

[24] TSD at 91-94.

[25] *See* Model Files, Central Analysis/input/market_data_000000.xlsx, Column BO; TSD at 95 Table 2-5.

[26] TSD at 200.

[27] *See, e.g.*, David Ferris, "General Motors: EVs are coming, but gas cars are staying," E&E News (Oct. 7, 2021).

[28] TSD at 172 Table 3-5 (referring to "93 AKI" fuel); *see also* TSD at 199 ("We chose to use the HCR1 engine map model despite using high octane fuel in model development because the performance of an existing engine (Mazda SkyActiv) on low octane fuel could be observed.").

NHTSA should also correct a modeling error affecting its central analysis and the "no HCR skip" sensitivity case. Though NHTSA stated it incorporated HCR1D in its central case and allowed further adoption of HCR2 in a sensitivity case, the technologies files for both appear to have actually excluded these packages. Specifically, "Availability" of HCR1D and HCR2 is left blank (i.e., not set to "TRUE") in Column D of the technologies files, causing those technologies to be unavailable for adoption in the modeling.[29] As a result, HCR1D is not available for adoption on any vehicles in the central analysis, contrary to NHTSA's stated intent.[30] And in the "no HCR skip" sensitivity case, both HCR1D and HCR2 are unavailable, meaning that sensitivity case instead just measures the effect of allowing all engines to adopt HCR0 and HCR1. NHTSA should ensure to actually include at least HCR1D in the final rule analysis; if NHTSA still does not allow HCR2 in the central analysis for the final rule (as CARB thinks it should), NHTSA should add a sensitivity case that makes the HCR2 package available, so that it can understand the impact of its (improper) decision to block automakers from adopting HCR2-level technology.

Lastly, as Gary W. Rogers, Vice President of Advanced Technology at Roush Engineering, explains in his expert report concerning EPA's proposal for its model years 2023-2026 vehicle greenhouse gas emission standards,[31] manufacturers are already incorporating at a rapid and increasing rate advanced technologies that reduce emissions, improve performance, and provide additional features that consumers prefer. Some of these technologies may be pertinent to NHTSA's analysis here to the extent they improve efficiency and fuel economy. For instance, the expansion of mild hybrid technologies at declining costs may enable even greater improvements, particularly as sales of vehicles with these technologies continue to grow.[32] As CARB explained in its comments on the SAFE proposal, many of the improvements to meet stringent fuel economy standards improve other attributes consumers value, or at least have not hindered those improvements. These include maintaining improvements in acceleration and smoother shifting from transmissions with an increasing number of gears.[33]

Thus, in CARB's view, NHTSA's analysis, while much improved, is still not reflective of the best information available; including demonstrably feasible technologies like HCR2 and cooled exhaust gas recirculation, allowing broader application of HCR technologies, and greater expansion of mild hybrid technologies will better enable NHTSA to establish the maximum feasible standards.

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[29] *See* Model Files Central Analysis/inputs/technologies_000000.xlsx, Sensitivity_Analysis_Inputs/technologies/technologies_02000.xlsx; *see also* CAFE Model Documentation at 32 ("[I]f [the Availability] field is set to TRUE, the technology will be available for application.").

[30] TSD at 171.

[31] Rogers, G., Roush Industries, Inc., Comments on: EPA Proposed Rule Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards (Roush Comments on EPA Proposed Rule), September 24, 2021.

[32] Roush Comments on EPA Proposed Rule at 9-11. Rogers also further explained the state of a particular mild hybrid technology, the 48V mild hybrid system, in separate comments also submitted to EPA. *See* Rogers et al., Roush Industries, Inc., *Technical Review of: 48V and Battery Electric Vehicles costs for Revised 2023 and Later Model Year Light – Duty Vehicle Greenhouse Gas Emission Standards*, EPA-HQ-OAR-2021-0208-0210 (Sept. 24, 2021).

[33] *See* CARB Detailed Comments at 66, 178, 180-84.

NHTSA also requested comment on how it should treat California's greenhouse gas and zero-emission vehicle standards here.[34] Assuming EPA finalizes its repeal of its SAFE 1 actions and restores California's waiver of Clean Air Act preemption before NHTSA finalizes these standards, NHTSA must consider California's standards, and it would be reasonable for NHTSA to include compliance with California's standards within a no-action baseline. CARB echoes the detailed comments from the California Attorney General's Office here.[35]

III. The Benefits of the Proposed Standards Outweigh the Costs and Are Greater Than NHTSA Estimated.

CARB agrees that more stringent standards will deliver significant benefits to society that outweigh their costs. CARB supports the work of NHTSA to reconsider the approach it took in the Final SAFE Rule to estimating the impacts of its fuel economy standards. But CARB believes more stringent standards are more beneficial than NHTSA estimates and encourages the agency to further improve its analysis of the costs and benefits in several respects.

A. Stringent Standards Increase Domestic Energy Security.

As Dr. Stanton discusses in her enclosed expert report, *An Analysis of NHTSA's Preliminary Regulatory Impact Analysis of Proposed 2021 Proposed Rulemaking for Model Years 2024-2026 Light-Duty Vehicle CAFE Standards*, NHTSA has improved its analysis of the energy security benefits of more stringent fuel economy standards, but still likely understates their benefits.[36] Stricter standards will benefit the United States through decreased exposure to volatile oil prices, reduced prices from reduced demand, and potential savings to the federal budget from reduced dependency on imported oil.

The proposed standards will reduce U.S. oil demand. Because the U.S. represents a significant portion of the global demand for oil, the proposed standards are thus likely to reduce the global price of oil, known as a monopsony effect. NHTSA disregards the monopsony impacts that come from decreased domestic demand, instead treating this effect as a neutral transfer payment. However, as Dr. Stanton explains, there is little evidence to support this claim, and NHTSA notably does not consider distributional effects.[37] The shift of costs to oil producers and away from U.S. consumers would likely have wider societal benefits than the other way around, particularly when considering that disadvantaged communities spend a greater proportion of income on gasoline. This is true regardless of the position of the U.S. as a net exporter. And this drop in price would compound the benefits expected from fuel savings, which NHTSA currently calculates based only on less fuel used at an unchanged price.[38]

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[34] 86 Fed. Reg. at 49,622.

[35] Multistate Comments at 35-41.

[36] Stanton, E., *An Analysis of NHTSA's Preliminary Regulatory Impact Analysis of 2021 Proposed Rulemaking for Model Years 2024-2026 Light-Duty Vehicle CAFE Standards*, Oct. 26, 2021 (hereinafter "Stanton Report").

[37] Stanton Report at 9-10.

Stricter standards that reduce consumption are also likely to reduce exposure to volatile prices. Dr. Stanton recognized that "NHTSA appears to conservatively understate the costs of global oil market instabilities, omitting costs of managing oil market volatility and likely underestimating U.S. exposure to global oil markets."[39] CARB recommends that NHTSA consider a broader range of sectors that can be impacted by oil imports and prices. This is expected to more accurately show the benefits from stricter standards, including on the budgets of the federal government and consumers.

Although NHTSA concludes that more stringent fuel economy standards will likely not result in any reduction in military expenditures,[40] available information suggests otherwise—and that this impact could be significant. The U.S. military helps secure international oil production and imports,[41] which is not without cost. Studies cited in EPA's Draft Regulatory Impact Analysis of its emission standards proposal for model years 2023-2026 estimate the implicit subsidy of crude oil for this security ranges from $11.25 to more than $30 a barrel.[42] Indeed, Crane et al. (2009) stated that the U.S. defense budget could be reduced by 12-15% if this crude oil security subsidy were no longer a consideration.[43] The defense budget in 2019 was $704 billion; if this were reduced 12%, it would save U.S. taxpayers more than $84 billion a year.

Moreover, the U.S. military is the largest single consumer of oil in the world, using about 100 million barrels (despite also heavily investing in clean technology).[44] Separate from expenditures for securing oil supply lines, a decrease in the price of oil from decreased demand would directly benefit the U.S. military budget by reducing its costs to purchase fuel. This effect can be quantified based on the estimated effects of the proposal on oil prices. CARB encourages NHTSA to do so.

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[38] Stanton Report at 10-11, 13-14; *see also* NHTSA PRIA at 95.

[39] Stanton Report at 9.

[40] *E.g.*, TSD at 575.

[41] *See* Sovacool, B.K & Brown, M. Competing Dimensions of Energy Security: An International Perspective. Georgia Tech and Ivan Allen College School of Public Policy. Accessed on October 24, 2018.https://smartech.gatech.edu/bitstream/handle/1853/27736/wp45.pdf.

[42] EPA DRIA at 3-22.

[43] EPA DRIA at 3-22.

[44] The U.S. military uses more oil than any other institution in the world—but it's also a leader in clean vehicle technology. The Union of Concerned Scientists. Accessed October 24, 2018. https://www.ucsusa.org/clean_vehicles/smart-transportation-solutions/us-military-oil-use.html#.W5BNzuhKjIV

Section 6.2.4.6 of NHTSA's Technical Support Document discusses the possible emergence of new considerations regarding energy security with the growth of electric cars on the road. The Energy Information Administration defines energy security as the uninterrupted availability of energy sources at an affordable price for everyone. Traditionally, petroleum is considered the primary source of energy in most discussions around energy security. However, as NHTSA notes, the interpretation of energy security may need to be changed in the future with the ongoing growth of electric cars and possible full electrification of the transportation sector.[45]

CARB supports and agrees with NHTSA's assessment and that the agency should be prepared to shift or expand energy security considerations to include electricity/charging availability. The transportation sector is the largest consumer of petroleum products in the United States, and it accounted for 14 million barrels per day of petroleum consumption in 2018.[46] The federal government laudably aims to have half of all new vehicles sold in the U.S. be zero-emission by 2030.[47] With a possible large-scale shift to electrify the transportation sector, any future discussion around energy security would benefit from considering the availability of a sufficient supply or availability of electricity as well as petroleum.

In sum, stricter fuel economy standards would deliver even greater benefits due to greater energy security than NHTSA has analyzed. And these benefits would reach the people that need them most—those with lower incomes who spend a greater percentage of their household budget on transportation. NHTSA should recognize and include these benefits in the final rule.

B. NHTSA's Rebound Effect and Sales Elasticity Are Too High.

NHTSA selected a 15 percent estimate for the rebound effect as being "well-supported by the totality of the evidence."[48] While this estimate is slightly better than that of the Final SAFE Rule, it is still too high.[49] As Professor Gillingham, a recognized authority on energy and environmental economics whose research on transportation, energy efficiency, and the adoption of new technologies has been widely published, notes in his enclosed expert analysis, it appears "NHTSA is misinterpreting the literature," as the best evidence supports a rebound estimate of 10 percent or lower.[50] NHTSA's "totality of the evidence" includes papers from outside the U.S. and from decades ago, both of which have diminished (if any) relevance here. Additionally, NHTSA also appears to give equal weight to studies using poorer data sources than odometer readings. Appropriately considering more recent and relevant evidence yields a much more defensible rebound estimate of 10 percent—though compelling evidence exists for 5 percent or even close to 0 percent.[51] NHTSA should apply a rebound effect of not more than 10 percent to estimate the impacts of the final rule.

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[45] Notably, the Alliance for Automotive Innovation recently issued a report providing, an overview of zero-emission vehicle trends within the second quarter of 2021, including zero-emission vehicle purchases state-by-state and expansion of public charging infrastructure. The report also notes that internal-combustion-engine vehicle sales fell by 1 percent in the second quarter of 2021 alone and almost 5 percent since the same time in 2020, while zero-emission vehicle sales in the second quarter of 2021 increased by 33 percent from first quarter sales. Alliance for Automotive Innovation, *Get Connected: Electric Vehicle Quarterly Report* (Oct. 2021), *https://www.autosinnovate.org/posts/papers-reports/Get%20Connected%20Electric%20Vehicle%20Quarterly%20Report%20Q2%202021.pdf*.

[46] EIA, Today in Energy, Aug 2019. *In the United States, most petroleum is consumed in transportation - Today in Energy - U.S. Energy Information Administration (EIA)*.

[47] The White House Fact Sheet, Aug 2021. *FACT SHEET: President Biden Announces Steps to Drive American Leadership Forward on Clean Cars and Trucks | The White House*.

[48] 86 Fed. Reg. at 49,714.

[49] CARB commented extensively on the rebound effect during the SAFE proposal, and also points NHTSA to those comments. *See* CARB 2018 Detailed Comments at 250-56.

NHTSA's selected sales price elasticity of -1 is also too high and not well-supported by the literature, which unduly overestimates the costs of the proposal and underestimates the benefits. As Professor Gillingham explains in his enclosed expert comment, the -1 estimate is an unfounded assumption—and an outdated one at that.[52] Even the EPA Science Advisory Board recently criticized a sales elasticity of -1. The best evidence supports an elasticity of -0.34 or even closer to 0. NHTSA should adopt this estimate of -0.34 as its base case and explore sensitivity cases using a sales elasticity closer to zero.

NHTSA should apply more reliable estimates of the rebound and sales elasticity effects of more stringent standards to provide more reliable estimates of the costs and benefits of the proposal. By doing so in both instances, the net benefits will be shown to be greater than otherwise estimated.

C. NHTSA's VMT Projections Are Not Matching Actual VMT.

NHTSA premised its projections of costs, benefits, and impacts of its proposal in part on modifications to the Federal Highway Administration's estimates of vehicle miles traveled by light-duty vehicles. The modifications reflected the effects of the pandemic on travel in 2019 and 2020 and projected those effects, concluding that the growth in VMT would return to a pace like that before the pandemic but at a lower level of total VMT.[53]

While CARB agrees with NHTSA's overall approach, the projected rate of VMT return and level of VMT does not align with California's experience. The latest available data and analysis suggests that VMT has returned to pre-pandemic levels already. Research and data show that while commuting may have decreased, non-commute VMT has increased significantly, and fuel consumption and congestion have returned to pre-pandemic levels as of May of 2021.[54] As a result, NHTSA's analysis understates fuel demand associated with its proposal.

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[50] Gillingham, K., *The Rebound Effect of Fuel Economy Standards: Comment on the Corporate Average Fuel Economy Standards for Model Years 2024-2026 Passenger Cars and Light Trucks*, at 3 (Oct. 18, 2021) (hereinafter "Gillingham Rebound Report").

[51] Gillingham Rebound Report at 4 (citing Small 2018, Hymel and Small 2015; Small and van Dender 2007).

[52] Gillingham, K., *The New Vehicle Demand Elasticity: Comment on the Corporate Average Fuel Economy Standards for Model Years 2024-2026 Passenger Cars and Light Trucks*, at 3-4 (Oct. 18, 2021).

[53] *See* TSD at 472-73.

CARB encourages NHTSA to consider that VMT and fuel consumption have returned to previous levels, which provides further support for the most stringent standards.

D. NHTSA's Congestion Costs Still Contain Errors.

NHTSA should return to its prior methodology for calculating congestion costs. In previous rulemakings, including the SAFE proposal, NHTSA just adjusted for inflation the marginal cost of congestion values estimated by a 1997 Highway Cost Allocation Study by the Federal Highway Administration (1997 Study).[55] The 1997 Study estimated the marginal cost of congestion based on three variables: the value of travel time, vehicle occupancy, and traffic volume. In the Final SAFE Rule, NHTSA abruptly attempted to derive a per-mile marginal cost of congestion by "updating" the three variables using various sources of newer data.[56] However, NHTSA's calculations were riddled with plain errors, such that the "update" overestimated congestion costs by over $27 billion.[57]

In the current proposal, NHTSA appears to have partially revised those calculations, producing a lower marginal cost of congestion than in the Final SAFE Rule. Unfortunately, errors remain. Most notably, NHTSA purports to have calculated a 53 percent increase in traffic volume between 1997 and 2017.[58] However, as aptly described elsewhere in the record,[59] NHTSA seems to have achieved this calculation by comparing vehicle miles for passenger cars per interstate lane miles in 1997 with vehicle miles for short-wheelbase light duty vehicles per interstate lane miles in 2017. This calculation is wrong because (1) it compares a figure for passenger cars to a figure for light-duty vehicles that includes sport-utility vehicles and vans, and (2) it is limited to interstate highways instead of all roads. As in the Final SAFE Rule, and despite intervening public criticism of its approach, NHTSA does not justify this methodology. Notably, EPA has abandoned this methodology in its recent proposal strengthening its light-duty vehicle greenhouse gas emission standards because "scaling the marginal per-mile congestion costs by the change in VMT per lane-mile on US highways from 1997 to 2017 does not account for changes in average speeds and improved road design, and may have the potential to over-estimate costs."[60] Instead, EPA returned to using the 1997 Study values adjusted for inflation.[61] For these reasons, and because no newer study of marginal congestion costs exists,[62] NHTSA should forego its "update" and instead use the figures from the 1997 Study, adjusted for inflation. This more justified approach would reduce projected congestion costs and more accurately demonstrate the net benefits of more stringent standards.

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[54] TRIP, *Transportation Impact and Implications of COVID-19* (May 2021); Goulias et al., UC Santa Barbara, *Revisiting the impact of teleworking on activity-travel behavior using recent data and sequence-based analytical techniques* (Dec. 2020); *see also* Cal. Dept. of Tax & Fee Admin., Motor Vehicle Fuel 10 Year Report (June 2021), https://www.cdtfa.ca.gov/taxes-and-fees/spftrpts.htm; David Zipper, *What if Working at Home Makes Us Drive More, Not Less?*, Slate (Apr. 7, 2021).

[55] *See, e.g.*, 83 Fed. Reg. at 43,106; Joint Technical Support Document, Final Rulemaking for 2017-2025 Light Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, EPA-HQ-OAR-2018-0283-0654, at 4-27 (Aug. 2012) (explaining NHTSA used the 1997 Study values adjusted to 2010 dollars and that it had taken this approach in preceding rulemakings).

[56] *See* 85 Fed. Reg. at 24,736-37.

[57] Proof Brief Public Interest Organization Petitioners, *Competitive Enterprise Institute et al. v. National Highway Traffic Safety Administration et al.*, No. 20-1145 (D.C. Cir., January 14, 2021), Docket No. 1880214 ("NGO SAFE Br."), at 28-32.

[58] TSD at 552 n. 753; 85 Fed. Reg. at 24,737 n. 1939.

[59] *E.g.*, NGO SAFE Br. at 29-30.

IV. The Proposal Provides Beneficial Emission Reductions to Mitigate a Changing Climate and Protect Public Health—Especially Those Most Exposed to Pollution.

Transportation is one of the main causes of air pollution that threatens our health and our climate. Climate change brought on by continued emissions of greenhouse gases is an existential threat.[63] And California continues to struggle with National Ambient Air Quality Standards (NAAQS), in large part because of its large population of vehicles. As NHTSA recognizes, its proposed fuel economy standards will reduce greenhouse gas and criteria pollutant emissions, including fine particulate matter (PM2.5) and the pollutants that form ground-level ozone (volatile organic compounds and oxides of nitrogen (NOx)). Reducing this pollution will deliver a range of important public health benefits, especially for communities that have been disproportionately impacted by pollution.

A. The Proposed Standards Will Provide Critically Needed Greenhouse Gas Reductions.

It is irrefutable that the climate is changing, driven by anthropogenic emissions of greenhouse gases—and the latest report from the Intergovernmental Panel on Climate Change (IPCC) makes clear that this change is happening more quickly than previously thought or expected. The impacts of climate change are widespread—from increased number and severity of wildfires to ocean acidification to worse droughts to sea level rise to severe heat waves to stronger storms—and are well documented.[64] Though some will persist for decades, there is still time to curb the severity and frequency of these impacts. Indeed, as the IPCC noted in its 2021 report, there is still time for world leaders to act, though it must be swift and will require significant transformational change.[65]

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[60] EPA DRIA at 3-43.

[61] EPA DRIA at 3-43.

[62] NHTSA similarly does not "update" the 1997 Study's marginal noise costs (instead just adjusting for inflation) because "little research is available to indicate how noise levels or the economic costs of noise might have changed." TSD at 553.

[63] *See, e.g.*, IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis, pp. SPM-5, 10. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.; Smith, *California hit by record-breaking fire destruction: 'Climate change is real, it's bad'*, Los Angeles Times, July 12, 2021, *California wildfires outpacing 2020, the worst on record - Los Angeles Times (latimes.com)*; Cart, Becker, *How unprepared is California for 2021's drought? | CalMatters*, May 30, 2021.

In the U.S., the transportation sector accounts for the greatest portion of greenhouse gas emissions[66]—and so reducing its emissions is critical. As NHTSA recognizes, all of its proposed alternatives will reduce greenhouse gas emissions compared to the existing standards, with Alternative 3 achieving the greatest reductions.[67] More specifically, NHTSA estimates that its proposed rule will avoid about 465 million metric tons of carbon dioxide, 500,000 metric tons of methane, and 12,000 metric tons of nitrous oxide (N2O).[68] These reductions play an important role in addressing climate change, and serve as a significant reason to finalize the most stringent standards feasible.

B. The Proposed Standards Will Reduce Harmful Particulate Pollution and Better Protect Public Health Through 2050.

PM2.5 pollution is a serious threat to public health. Recent evidence adds to the wealth of literature showing the harmful human health effects of PM at levels below the federal health-based air quality standards. In its review of the NAAQS for PM, EPA's Integrated Science Assessment document found strong associations between short and long-term PM2.5 exposure and mortality and cardiovascular and respiratory effects.[69] As stated in CARB's and the California Office of Environmental Health Hazard Assessment's June 29, 2020 letter to the EPA Administrator, many epidemiological research studies and EPA scientists have reported that health effects have been demonstrated below the current NAAQS standards.[70] For example, significant associations have been found between PM2.5 levels below the current EPA annual NAAQS standard and premature mortality in multicity epidemiological studies in the U.S. and Canada.[71] Therefore, even areas currently in attainment for the PM2.5 NAAQS would see health benefits from decreased PM levels, including the decreases that would flow from finalizing this proposal.

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[64] *See, e.g.*, Multistate Comments at 8-16.

[65] *See, e.g.*, IPCC, Summary for Policymakers, *supra* note 63, at SPM-36 to -42.

[66] EPA, *Sources of Greenhouse Gas Emissions*, *https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions* (last updated July 27, 2021).

[67] *E.g.*, 86 Fed. Reg. at 49,778-80, 49,795.

[68] 86 Fed. Reg. at 49,618, 49,777.

[69] Integrated Science Assessment (ISA) for Particulate Matter (Final Report, 2019). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-19/188, 2019. Available at *https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=347534*.

[70] CARB and OEHHA, June 29, 2020 letter to U.S. EPA Administrator Andrew R. Wheeler, Docket ID No. EPA-HQ-OAR-2015-0072-0069, at 22; Policy Assessment for the Review of the National Ambient Air Quality Standards for Particulate Matter. U.S. Environmental Protection Agency, Washington, DC, EPA-452/R-20-002, 2020. Available at *https://www.epa.gov/system/files/documents/2021-10/final-policy-assessment-for-the-review-of-the-pm-naaqs-01-2020.pdf*.

In addition, exposure to elevated pollution levels has been found to increase vulnerability to other types of illnesses. Studies in the U.S. and Europe have demonstrated associations between chronic elevated PM2.5 exposure and increased COVID-19-related premature death and illness. Wu et al., found long-term exposure to PM2.5 was associated with a significant increase in COVID-19 mortality in the U.S.[72] Additionally, a study by Pozzer and colleagues found that PM2.5 air pollution contributed to COVID-19 mortality: approximately 15% worldwide and 17% in North America.[73] These results suggested that air pollution is an important cofactor increasing COVID-19 mortality risk.

C. Stringent Standards Will Reduce Disparate Pollution Impacts.

Environmental justice and equity have rightly gained much attention at the federal level in recent years. NHTSA's proposal acknowledges the pollution disparities faced by communities with environmental justice concerns generally.[74] While comprehensive air quality and health risk modeling is critical to fully understanding the impacts of the proposal on impacted populations, proximity to emissions sources is a useful indicator of potential exposure and a reasonable screening metric to emphasize and evaluate the disproportionate impacts faced by communities near roadways and the property lines of stationary sources whose operations may be affected by the proposal, like petroleum refineries. In many over-burdened communities, the pollution and public health impacts from on-road vehicle emissions are especially significant and greater than in other communities. These impacts are often compounded by the congregation of nearby industrial sources, including upstream, mid-stream, and downstream fuel production sources. Recognizing and underscoring the cumulative effects of socio-economic and environmental burdens in these communities is a critical first step.

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[71] *See* Crouse DL, Peters PA, van Donkelaar A, Goldberg MS, Villeneuve PJ, Brion O, Khan S, Atari DO, Jerrett M, Pope CA, Brauer M, Brook JR. Martin RV, Stieb D, & Burnett RT. 2012. Risk of nonaccidental and cardiovascular mortality in relation to long-term exposure to low concentrations of fine particulate matter: a Canadian national-level cohort study. Environmental health perspectives, 120(5), 708–714. *https://doi.org/10.1289/ehp.1104049*; Di Q, Wang Y, Zanobetti A, Wang Y, Koutrakis P, Choirat C, Dominici F, Schwartz J. 2017. Air Pollution and Mortality in the Medicare Population. N Engl J Med 376: 2513-2522; Shi L, Zanobetti A, Kloog I, Coull BA, Koutrakis P, Melly SJ, Schwartz JD. 2016. Low-concentration PM2.5 and mortality: Estimating acute and chronic effects in a population-based study. Environ Health Perspect. 124(1):46-52. doi:10.1289/ehp.1409111; Wang Y, Shi L, Lee M, Liu P, Di Q, Zanobetti A, & Schwartz JD. 2017. Long-term exposure to PM2.5 and mortality among older adults in the Southeastern US. Epidemiology, 28(2), 207–214, *https://doi.org/10.1097/EDE.0000000000000614*; Zeger SL, Dominici F, McDermott A, & Samet JM. 2008. Mortality in the Medicare population and chronic exposure to fine particulate air pollution in urban centers (2000-2005). Environmental health perspectives, 116(12), 1614-1619. *https://doi.org/10.1289/ehp.11449*; Wu X, Braun D, Schwartz J, Kioumourtzoglou A, and Dominici F. 2020a. Evaluating the impact of long-term exposure to fine particulate matter on mortality among the elderly. Sci Adv. DOI: 10.1126/sciadv.aba5692.

[72] Wu X., Nethery RC, Sabath MB, Braun D, and Dominici F., Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis. Sci Adv. 2020 Nov; 6(45): eabd4049, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7673673/.

[73] Pozzer A, Dominici F, Haines A, Witt C, Münzel T, Lelieveld J., Regional and global contributions of air pollution to risk of death from COVID-19, Cardiovasc Res. 2020 Dec 1;116(14):2247-2253. https://pubmed.ncbi.nlm.nih.gov/33236040/.

[74] *See, e.g.*, NHTSA, Corporate Average Fuel Economy Standards Model Years 2024-2026 Draft Supplemental Environmental Impact Statement at 7-10 to 7-17 (Aug. 2021).

1. NHTSA Has Environmental Justice Obligations and Should Factor Those in Accordingly.

Environmental equity means that no group or community bears a larger, unfair share of harmful effects from pollution or environmental hazards, or, in other words, environmental benefits and burdens should be equitably distributed. And achieving environmental justice is about recognizing past injustices and taking steps to address them and avoid their proliferation. Historic policies, like redlining, forced certain communities to be nearer highways, trains, factories, and other major pollutant-emitting sources. To remedy the continuing impacts, environmental equity considerations, including community engagement, must be embedded in governmental decision-making.[75]

Federal authorities and both longstanding and recent Presidential Executive Orders (E.O.) underscore the necessity of environmental justice and increasing environmental equity through federal actions. Title VI of the Civil Rights Act of 1964 prohibits discrimination based on race, color, or national origin by programs and activities that receive federal assistance.[76] E.O. 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations," directs "each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations[.]"[77]

President Biden has issued several E.O.s that underscore the need to remedy environmental inequity and direct the federal government to prioritize environmental justice. E.O. 14008, "Tackling the Climate Crisis at Home and Abroad," provides: "Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities[.]"[78] Perhaps most significantly, it creates a government-wide "Justice40 Initiative," establishing a goal that 40 percent of the overall benefits of relevant federal funding flow to disadvantaged communities.[79]

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[75] Past Racist "Redlining" Practices Increased Climate Burden on Minority Neighborhoods. *https://www.scientificamerican.com/article/past-racist-redlining-practices-increased-climate-burden-on-minority-neighborhoods/*

[76] § 601, 42 U.S.C. § 2000d et seq. ("No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."). *But see Alexander v. Sandoval*, 532 U.S. 275 (2001) (private right of action to enforce § 601 is limited to intentional discrimination).

[77] E.O. 12898, Feb. 11, 1994, 59 Fed. Reg. 7,629 (Feb. 16, 1994), § 1-101.

E.O. 14030 directs the federal government to take action on climate-related financial risk "while accounting for and addressing disparate impacts on disadvantaged communities and communities of color" and using climate finance to advance "environmental mitigation, especially in disadvantaged communities and communities of color[.]"[80] E.O. 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government," acknowledges: "Our country faces converging economic, health, and climate crises that have exposed and exacerbated inequities," and directs the federal government to "pursue a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality."[81]

NHTSA should act within its statutory authority consistent with these further obligations. NHTSA's actions have the potential to reduce the risk of dangerous climate change, conserve energy, and achieve cleaner air, especially in areas that have been disproportionately impacted and are most vulnerable. Looking at the distributional and equity impacts of the proposed standards is critical to ensuring that all communities benefit and are not negatively impacted. More stringent fuel economy standards are likely to deliver greater health benefits to the communities that suffer the most from pollution from motor vehicles and the fossil fuels that power them, as illustrated more next.

2. The Los Angeles Area Illustrates the Importance of Stringent Standards.

The community of Wilmington, Carson, and West Long Beach in the greater Los Angeles region is an example of an overburdened community. It is impacted by a variety of sources including freight, freeway traffic, port and rail operations, oil and gas production, and five petroleum refineries—indeed, petroleum refining and related activities are one of the major sources of emissions in this region (see Figure 1, below).[82] Its population shows a greater degree of health impacts from air pollution than other California communities. The community has a high cumulative air pollution exposure burden, a significant number of sensitive receptors, and includes census tracts that have been designated as disadvantaged communities by California law.[83]

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[78] E.O. 14008, Jan. 27, 2021, 86 Fed. Reg. 7,619 (Feb. 1, 2021), § 219.

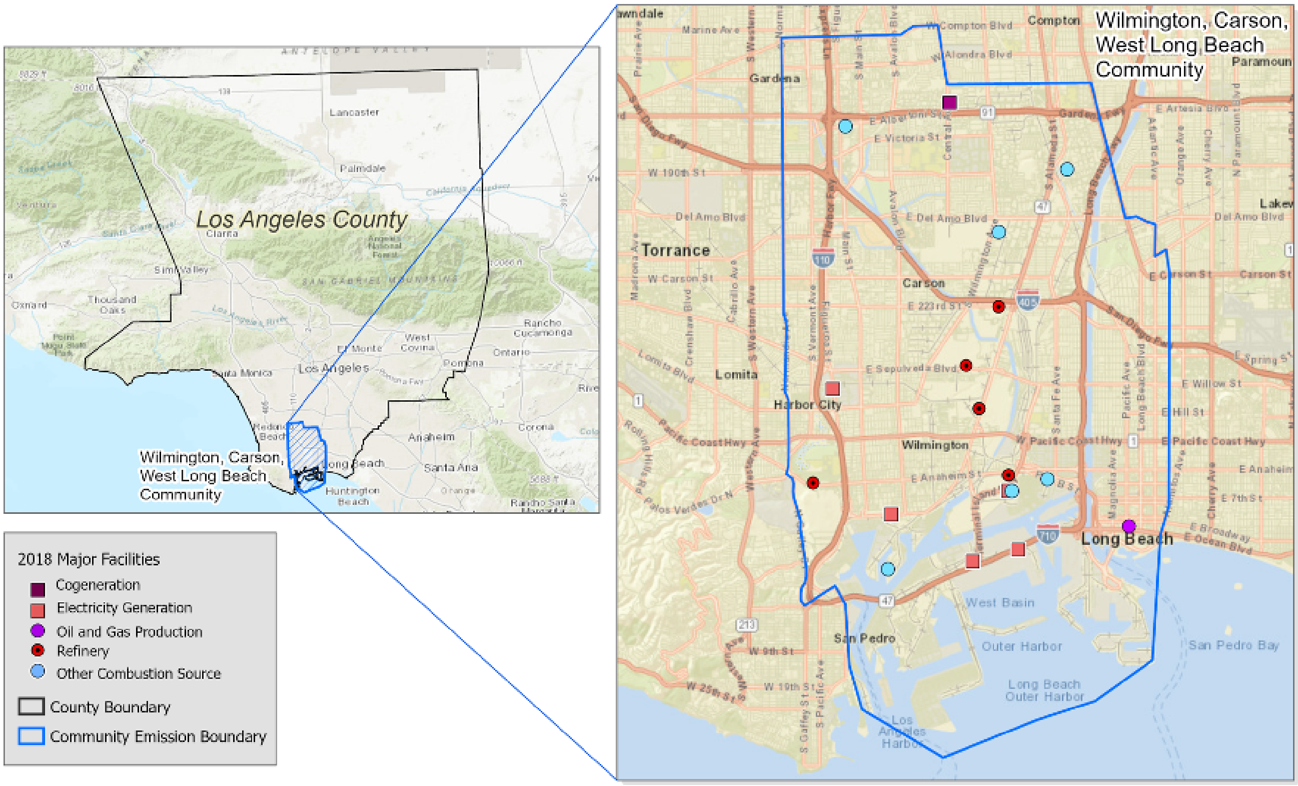
[79] E.O. 14008, Jan. 27, 2021, 86 Fed. Reg. 7,619 (Feb. 1, 2021), § 223.

[80] E.O. 14030, May 20, 2021, 86 Fed. Reg. 27967 (May 25, 2021), §§ 1, 2(c).

[81] E.O. 13985, "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (EO 13985, Jan. 20, 2021, 86 Fed. Reg. 7009 (Jan. 25, 2021), § 1.

[82] The figure shows major industrial sources of criteria air pollutant emissions that are subject to California's Greenhouse Gas Mandatory Reporting Regulation (MRR).

Figure 1. Wilmington, Carson, West Long Beach Community


Los Angeles County
Wilmington, Carson, West Long Beach Community
2018 Major Facilities
🟪 Cogeneration
🟥 Electricity Generation
● Oil and Gas Production
● Refinery
● Other Combustion Source
☐ County Boundary
☐ Community Emission Boundary
Wilmington, Carson, West Long Beach Community
Lancaster
Palmdale
Santa Clarita
Simi Valley
Oxnard
Thousand Oaks
Los Angeles
Santa Monica
El Monte
West Covina
Pomona
Rancho Cucamonga
Ontario
Anaheim
Santa Ana
Long Beach
Huntington Beach
Corona
Gardena
Compton
Torrance
Carson
Lomita
Harbor City
Wilmington
San Pedro
Long Beach
West Basin
Outer Harbor
Long Beach Outer Harbor
Los Angeles Harbor
San Pedro Bay

Based on the 2018 American Community Survey (ACS) data from the Census Bureau,[84] more than 310,600 people live within the Wilmington, Carson, West Long Beach community boundary. Approximately 67 percent of the population in this community is Latino and African American compared to a statewide average of 44 percent (Figure 2), nearly 13 percent are children under the age of 10 years, and 13 percent of the population is elderly (over the age of 65 years). These population characteristics are important indicators of disparities in existing pollution burden, exposure to air pollution, and health vulnerabilities—especially for children and the elderly.

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[83] Disadvantaged community designations per Senate Bill 535 (De Le†n, Chapter 830, Statutes of 2012).

[84] U.S. Census Bureau, 2014-2018 American Community Survey 5-year Estimates. *https://data.census.gov/cedsci/*

Figure 2. Comparison of Population by Race/Ethnicity in Wilmington, Carson, West Long Beach Community and the State of California using the Latest American Community Survey 5-year Estimates (2014-2018)

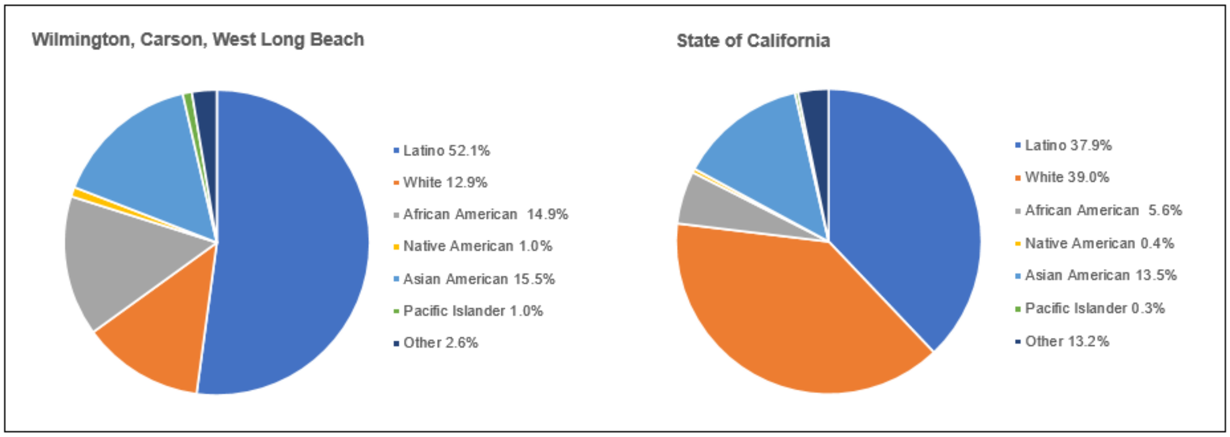
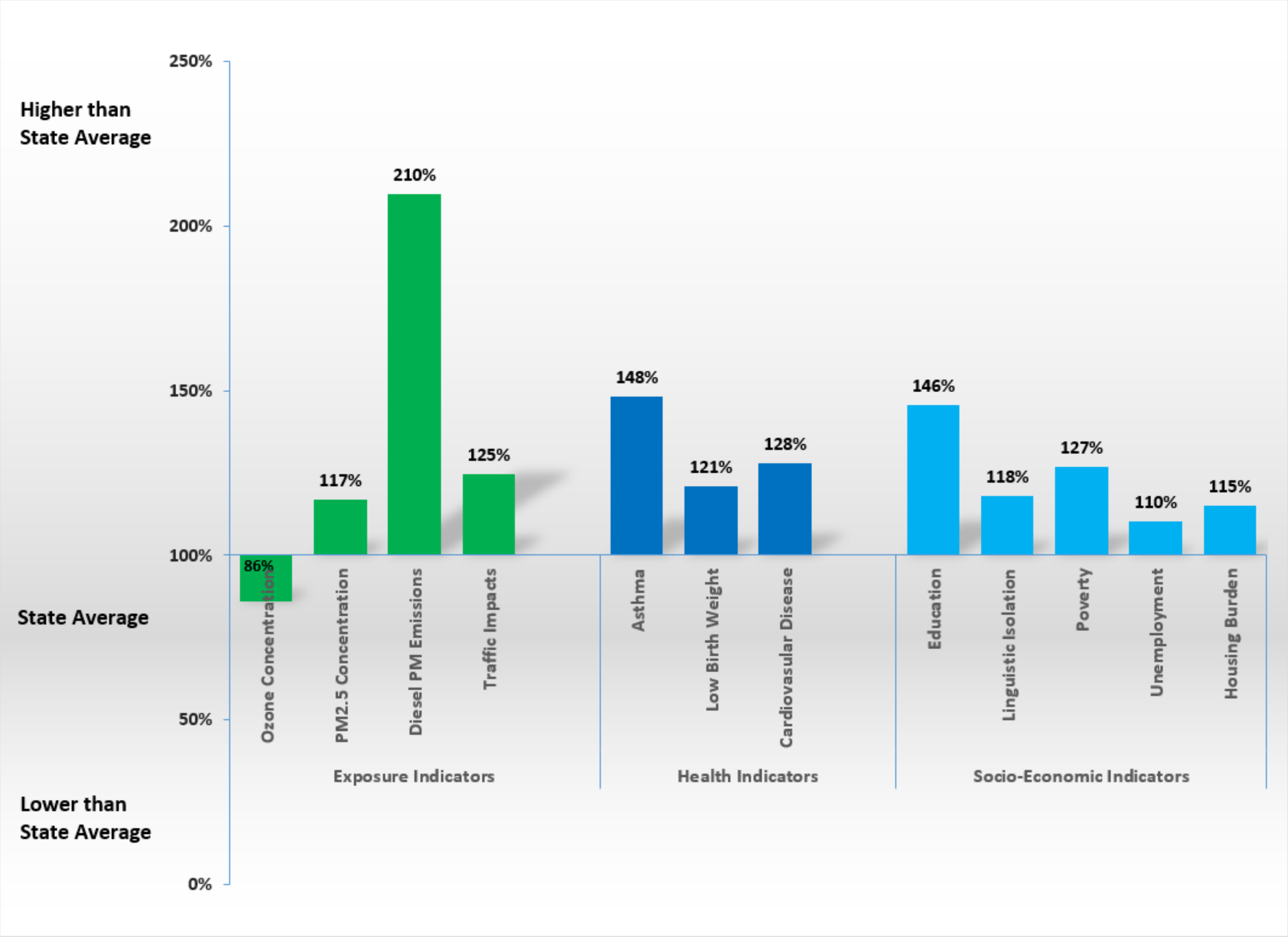


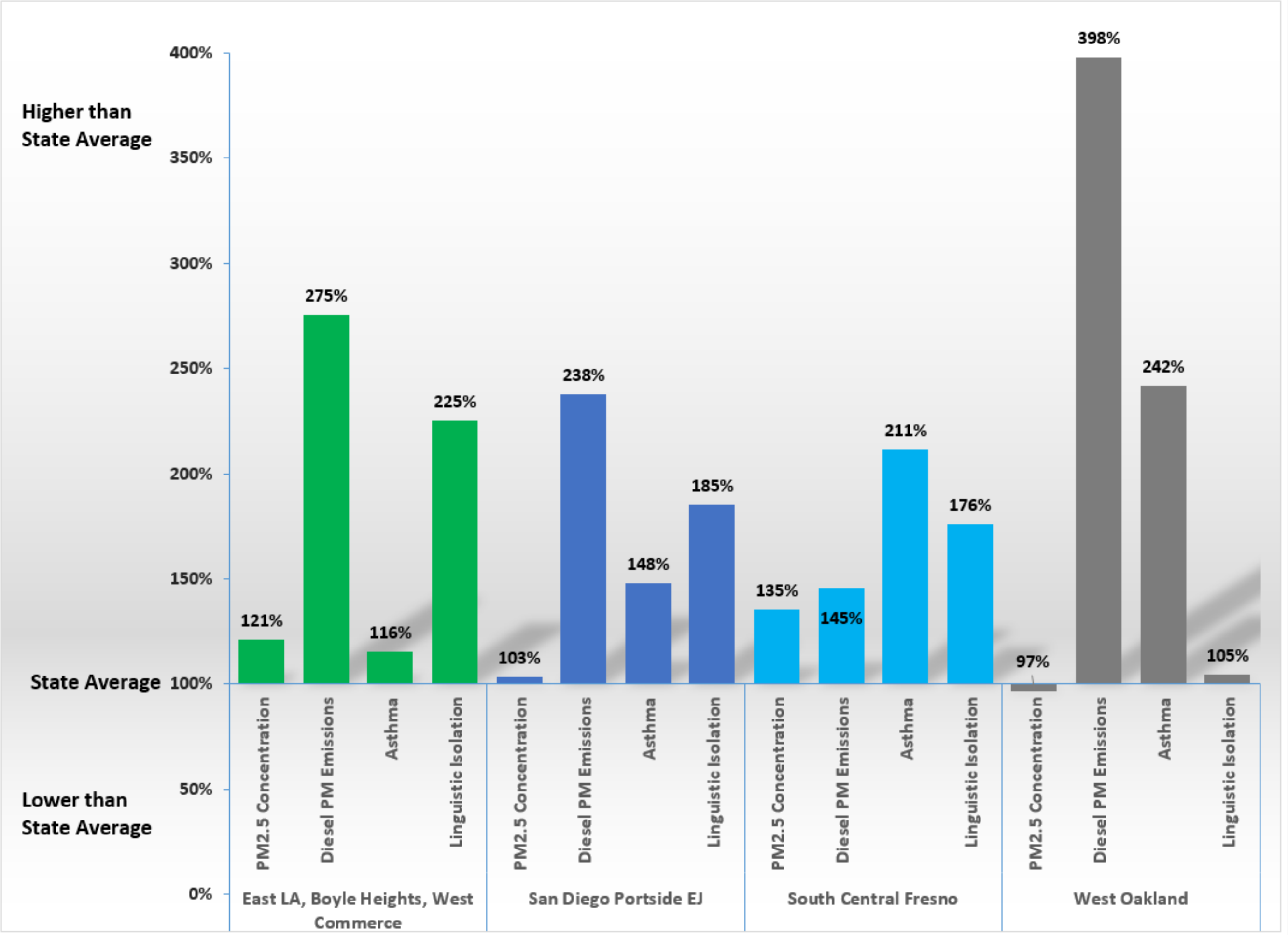
Figure 3 compares the average scores for exposure (e.g., ozone, PM2.5, diesel PM, traffic impacts), health status (asthma, cardiovascular disease, low birth weight), and socio-economic (education, linguistic isolation, poverty, unemployment, and housing burden) indicators in the community against statewide averages—the community scores for these key indicators are generally higher compared to the statewide averages.

Figure 3. DRAFT CalEnviroScreen (CES) 4.0 Scores for Key Indicators in the Wilmington, Carson, West Long Beach Community Relative to Statewide Averages



The indicators discussed above explain the disparate effects of air pollution faced by many communities in California, which extends to numerous other communities across the nation. Figure 4 presents the average scores for PM2.5 concentrations and diesel PM emissions relative to statewide averages for a few communities across the State; vehicle emissions contribute predominantly to the particulate matter and diesel PM impacts in these communities. The chart includes asthma related emergency room visits and linguistic isolation (i.e., limited English speaking) as proxies for demographic and socio-economic disadvantages faced by these communities.

Figure 4. DRAFT CES 4.0 Scores for PM2.5 Concentrations, Diesel PM Emissions, and Socio-economic Indicators in California Communities



Existing scientific literature conclusively links air pollution to adverse health outcomes, including pre-mature mortality, and the disproportionate pollution and health burden on poor and socially disadvantaged communities. California's Office of Environmental Health Hazard Assessment's draft CalEnviroScreen (CES) 4.0 report provides an exhaustive review of existing literature connecting each of the indicators used in the CES method to pollution burden and population sensitivities.[85] A 2019 CARB research study revealed on-road vehicles and industrial activity to be the top two sources of exposure in California, each contributing to 24 percent of the total PM2.5 exposure, and disproportionately impacting non-white and low-income populations.[86]

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[85] OEHHA Draft CES 4.0 Report (Feb 2021), pages 26-191, "Individual Indicators: Description and Analysis". *https://oehha.ca.gov/media/downloads/calenviroscreen/document/calenviroscreen40reportd12021.pdf*

Additionally, several occupational studies of refineries, petroleum storage, and distribution facilities have found that benzene exposure can increase the risk of hematological malignancies (i.e., cancers affecting the blood, bone marrow, lymph, and lymphatic system) among workers, even at low daily concentrations below 0.1 ppm. Hazardous releases from these facilities are also believed to increase the risk of cancer incidences in fence line communities.[87] The research report, "A systematic review and meta-analysis of hematological malignancies in residents living near petrochemical facilities," referenced 16 studies that recorded the incidences of hematological malignancies across 187,585 residents living within five kilometers of petrochemical sites (upstream, midstream and downstream), across varied geographical locations, between 1960 and 2011. Findings showed that those living within five kilometers of a petrochemical facility have a 30% higher risk of developing leukemia than residents from communities with no petrochemical activity.

The 2019 report, titled "Chemical exposures, health and environmental justice in communities living on the fence line of industry," compared emergency department visits and hospital admissions 4 weeks after and 4 weeks prior to the 2012 major chemical release event at the Chevron refinery in Richmond, California. Results showed a 3.7-fold increase in the number of people seeking care at emergency departments within the zip codes closest to the refinery. The visits were for treatment of sensory/nervous system conditions (migraine headaches, eye conditions, and dizziness), asthma, upper and lower respiratory conditions, and chest pain.[88]

Research has also shown that refineries are more likely to be located in low-income communities of color who likely experience greater social stressors that may make them more vulnerable than others to the health impacts of such exposure. This is presented in the 2017 report, "Fumes Across the Fence-Line the Health Impacts of Air Pollution from Oil & Gas Facilities on African American Communities." The report discussed a case study based out of the City of Richmond, which houses five petroleum refineries within a condensed region. The case study presents the fact that residents of color disproportionately live near the refineries and chemical plants and acknowledges that while there have been many strides to clean up these major sources of air pollution, health impacts in the region, including cancer rates, are still disproportionately high.[89]

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[86] Apte J. et al. (2019). A Method to Prioritize Sources for Reducing High PM2.5 Exposures in Environmental Justice Communities in California. CARB Research Contract Number 17RD006. *https://ww2.arb.ca.gov/sites/default/files/classic//research/apr/past/17rd006.pdf*

[87] Jephcote C. et al. (2020). A systematic review and meta-analysis of hematological malignancies in residents living near petrochemical facilities, Environmental Health. *https://ehjournal.biomedcentral.com/track/pdf/10.1186/s12940-020-00582-1.pdf*

[88] Johnston, J., Cushing, L. (2020). Chemical Exposures, Health, and Environmental Justice in Communities Living on the Fenceline of Industry. Curr Envir Health Rpt 7, 48–57 (2020). *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7035204/*

In sum, many overburdened communities experience significantly higher levels of both regional and near-source air pollution, and the demographic and socio-economic characteristics of these communities exacerbate their susceptibility and vulnerability to the adverse effects of air pollution. The Wilmington, Carson, Long Beach community is just one example of many such communities across the nation that bear the consequences of multiple sources of air pollution. For these fence-line communities, reducing emissions from concentrated mobile and stationary sources—as NHTSA's proposal will do—is a priority.

V. Conclusion

CARB welcomes NHTSA's proposal to establish more stringent fuel economy standards. This proposal, unlike the existing standards, properly considers NHTSA's statutory directives, and will provide important efficiency, climate, and public health benefits. CARB urges NHTSA to at least make the adjustments described above—specifically, include broader applications of available cost-effective technologies, fix the HCR modeling error, better and more holistically account for energy security benefits, adjust its rebound and sales elasticity estimates, adjust VMT projections, and revert to its previous congestion costs methodology—and adopt the most stringent standards NHTSA determines are the maximum feasible.

Please contact Mr. Craig Segall, Deputy Executive Officer, at *Craig.Segall@arb.ca.gov* for any questions you may have about our comments.

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[89] Fleischman L., Franklin M. (2017). Fumes Across the Fence-line. Clean Air Task Force. *https://www.catf.us/wp-content/uploads/2017/11/CATF_Pub_FumesAcrossTheFenceLine.pdf*